REPORT ON AN EMERGENCY AMBIENT AIR SURVEY IN THE VICINITY OF THE CANADIAN PACIFIC TRAIN DERAILMENT LONDON

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of the
Environment

Ontario

The Honourable
Harry C. Parrott, D.D.S.,
Minister

Graham W. S. Scott, Q.C.,
Deputy Minister

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AIR RESOURCES BRANCH

Technology Development and Appraisal Section

Monitoring and Instrumentation Development Unit

ARB-TDA-Report No.49-80

Report on an Emergency Ambient Air Survey in the Vicinity of the Canadian Pacific Train Derailment London

June, 1980

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01. SUMMARY:

The objective of this ambient air survey was to monitor gaseous contaminants and meteorological conditions during the clean-up phase of the Canadian Pacific train derailment at the Lobo siding, near London, Ontario.

This report cannot and does not comment on any conditions near the derailment site which existed from the time of the derailment (approximately 2015 hours on June 9th) to the time of the Mobile Air Monitoring (MAM) unit's arrival (approximately 0700 hours on June 10th) nor after the MAM unit's departure (approximately 2400 hours on June 10th, 1980) from this site.

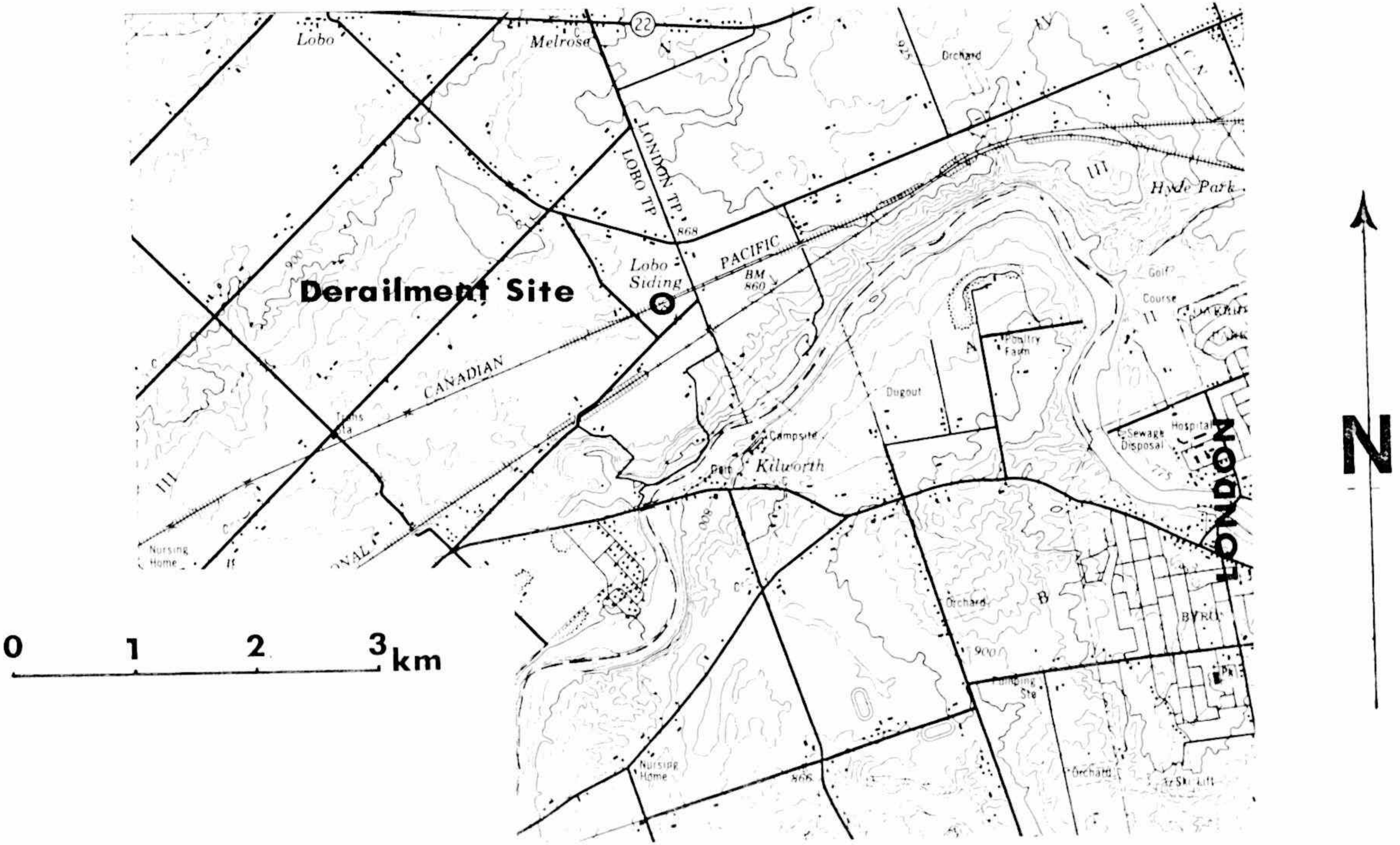
No major air pollution episode resulted from the clean-up. Very little sulphur dioxide was detected in the vicinity of the derailment site. The mobile air monitoring unit was placed downwind of the site whenever possible and the maximum instantaneous and one-hour average ground level concentration (glc) of sulphur dioxide detected were 0.049 parts per million (ppm) and 0.018 ppm (7% of the desirable ambient Air Quality Criterion) respectively.

02. INTRODUCTION:

A request for emergency ambient air monitoring from the SW Region was relayed by Mr. L. Shenfeld to Dr. E. Singer at 2345 hours on Monday, June 9, 1980. The Monitoring and Instrumentation Development Unit was mobilized. The Mobile Air Monitoring (MAM) unit was immediately pulled off its' scheduled ambient air monitoring programme in the Clarkson/Oakville area and left Toronto at 0230 hours, Tuesday, June 10, 1980. The unit arrived at the scene of the accident at 0630 hours of the same day.

A Canadian Pacific freight train had derailed at the Lobo Siding, near Hyde Park approximately 10 km due west of London. Ambient air monitoring for ground-level concentrations of sulphur dioxide and total hydrocarbons were specifically requested since a tanker containing liquid sulphur dioxide had derailed and a fire (fuelled by light coal oil) had erupted at the crash site. In addition, on-site meteorological data (ground-based and upper air wind/temperature profiling) was consisdered to be of the utmost importance in order to forecast atmospheric dispersion.

CANADIAN PACIFIC DERAILMENT SITE
JUNE 1980



MAP #1

03. INSTRUMENTATION AND SAMPLING METHODOLOGY:

The emergency request involved monitoring for gaseous sulphur dioxide (SO_2), total hydrocarbons (THC), and the pertinent meteorological conditions.

The main purpose of this ambient air monitoring programme was to provide real-time analyses in the vicinity of the derailment site for these two major contaminants and to immediately advise the personnel involved in the clean-up operation of any hazardous conditions.

Monitoring Technique:

(i) Sample Collection (MAM Unit)

Gaseous ambient air samples were taken at a constant flow rate (approximately 0.2 m^3/min) by a probe located on the van and whose orifice was located approximately 5 m above ground level. Air samples entered a manifold from which a short teflon sampling line was connected to each analytical instrument. This arrangement ensured little or no sample degradation, minimal response time, and minimal sample contamination due to ground level sources (e.g., entrained soil, vehicular traffic, etc.)

(ii) Instrumentation - analyzers

The instrumentation associated with the MAM unit is presented in Table #1, on page 7.

(iii) Meteorological Analyses

Ground-based and upper air meteorological conditions were monitored on a continuous basis by the instrumentation associated with the MAM unit (ref. Table #1, page 7).

(iv) Calibration - Analyzers:

Analyzers and sources were calibrated before the survey. During the survey, the analyzers' calibration was checked at least once every 8 hours using the sources and built-in electronic circuitry. All monitors were found to be extremely stable and the calibration remained within the prescribed limits throughout the duration of the survey.

(v) The ambient air monitoring sites are shown in Map #2 on page 8 and are listed below. All monitoring sites were referenced to the derailment site whose UTM co-ordinates were 46825-475825.

TABLE #2

Monitoring Period	UTM Co-ordinates	MAP I.D.
Hyde Park #1/3	46840-475815	A
Hyde Park #4	46915-475675	B
Hyde Park #5/6	46860-475810	C

(vi) Results

Definition of Terms

Scanning Time:	Time interval for averaging and data logging for instantaneous interrogations of the analytical instruments by the Data Acquisition System.
Time:	Time of first and final scans used to determine running averages.
Number of Readings:	Number of Scans
MAM:	Mobile Air Monitoring
glc	Ground level concentration

All statistical values are based on 60 second averages of instantaneous interrogations of the analytical instruments and all results are expressed in parts per million (ppm). The processed data incorporated in this survey are presented in the appendix.

The concentration/time graphs depicted in this report represent running 60-minute average glc's of a specific pollutant which were acquired during the 60-second scan time interval.

The wind rose analyses depicted in this report represent 60-minute average glc directional analyses of a specified pollutant and a frequency directional analyses of the prevailing wind.

Table 1: INSTRUMENTATION - MAM

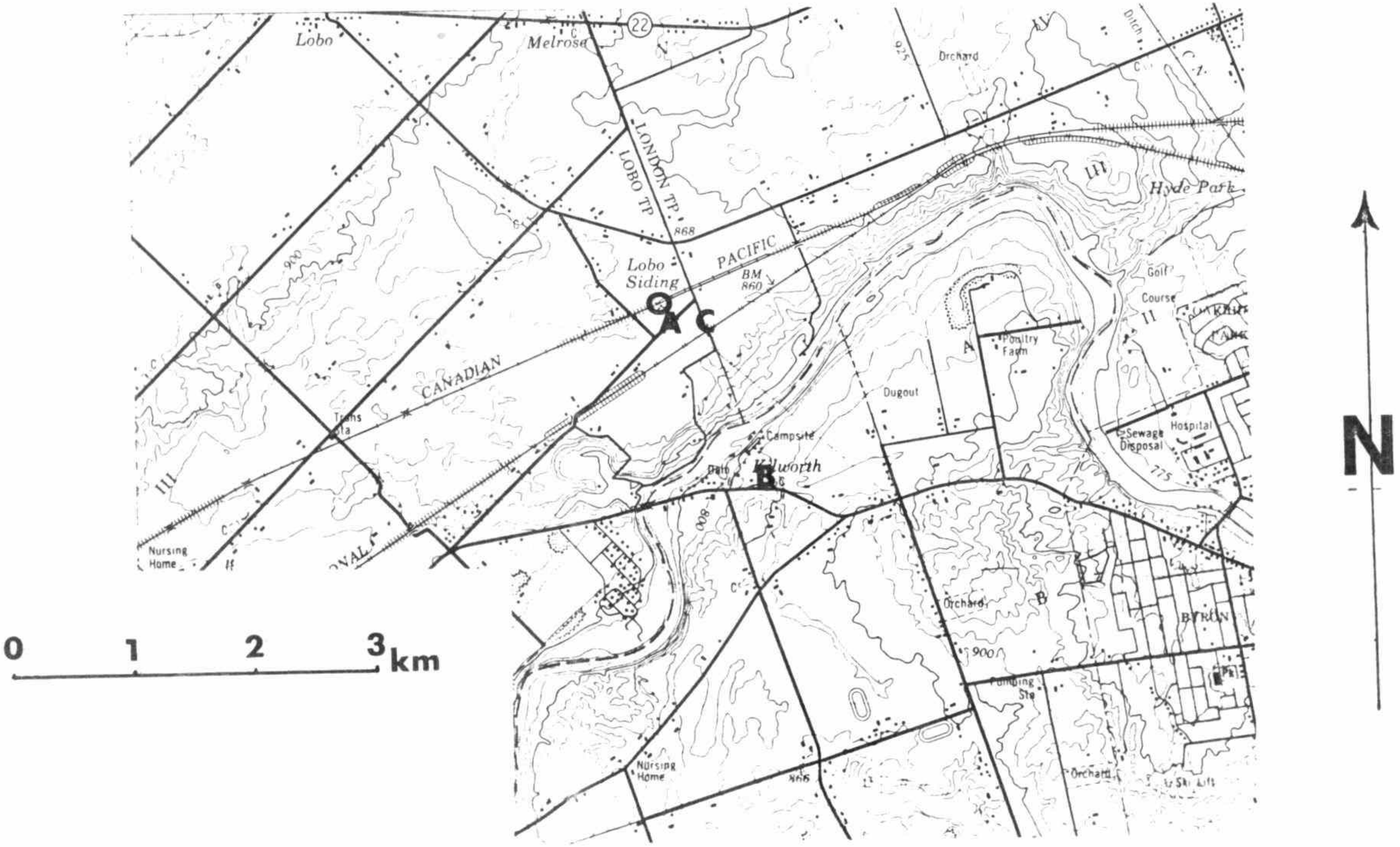
Instrument	Manufacturer	Analytical Technique	Maximum Sensitivity (Full Scale)
H_2S Source	Hartmann & Braun (H&BPrüfgasgenerator)	N/A	N/A
H_2S Analyzer	H&B Picos	electrochemical	0.05 ppm
SO_2 Source	H&B Prüfgasgenerator	N/A	N/A
SO_2 Analyzer	H&B Picoflux 2	conductometric	0.3 ppm
O_3 Analyzer/Source	Bendix 8002	chemiluminescent	0.05 ppm
NO_x, NO_2, NO Analyzer	Bendix 8101-B	chemiluminescent	0.5 ppm
CO Analyzer	H&B Uras 2T	Infrared Absorption	50 ppm
THC, CH_4, THC-CH_4 Analyzer	Ingenieur - Produktions-Gruppe München (IPM) RS-t	Dual flame ionization detector	50 ppm THC (as CH_4)
Hg Analyzer	Scintrex HGP-2	Ultra-violet Absorption	200 ng/m^3
CO, THC, THC-CH_4, CH_4 source	Matheson	compressed gas	N/A

Instrument	Manufacturer	Scale
**Wind speed	Lambrecht gmBH	km/hr
**Wind Direction	Lambrecht gmBH	degrees
Temperature	Weather Measure (WM) T621	°C
Relative humidity	WM-HM-11P	percent
Barometric pressure	WM-BM70-B242	millibars
Solar radiation	WM Star Pyranometer	watts/cm^2
Minisonde receiver	Aero Aqua Inc.	°C and km/hr

** These wind indicators are located on top of a 10-metre retractable mast.

AMBIENT AIR MONITORING SITES

CP DERAILMENT, JUNE 1980



MAP #2

04. DISCUSSION:

A cold front had moved through the London area earlier on Monday and the winds were northwesterly and brisk. However during Monday night, the winds became calm and the sky was clear. Very low temperatures were reported in this area and a frost warning had been issued by Environment Canada.

The MAM unit arrived at the Lobo Siding area at 0630 hours on Tuesday, June 10th. Calibration of the analytical instruments was undertaken immediately and a vertical temperature and wind profile of the atmosphere was carried out at 0650 hours. This minisonde sounding is presented in Graph #4 on page 24. The winds were relatively calm (approximately 10 to 20 km/hr) throughout the lower 200 metres and there was evidence of a slight nocturnal inversion extending from the ground up to approximately 500 metres. The winds above this level were approximately 40 to 50km/hr from the northwest.

The MAM unit then proceeded to a location approximately 0.15 km downwind of the derailment site. Ambient air monitoring was initiated at 0740 hours and continued until 1146 hours with the exception of two 15 to 20 minute interruptions for minisonde flights; flight #2 at 0804 hours and flight #3 at 1027 hours. Because of these interruptions, this monitoring period is referred to as Hyde Park #1/3 and a summary of the acquired ground level concentration (glc) data for SO_2, THC, H_2S and O_3 is presented in Table #3 on page 14.

As noted in this statistical summary table, low glc's of SO_2 and THC were detected during monitoring period Hyde Park #1/3. The maximum instantaneous and one-hour average SO_2 glc's were 0.049 parts per million (ppm) and 0.018 ppm (7% of the desirable Ambient Air Quality Criteria; 0.25 ppm) respectively. The maximum instantaneous and one-hour average THC glc's were 8.15 ppm and 0.601 ppm respectively. The concentration/time analyses of the glc data acquired during this monitoring period are presented in Graph #1 on page 15. Since this graph depicts running one-hour averages of the acquired glc data, the time intervals for the minisonde flights are denoted for the reader's convenience.

From wind frequency and concentration rose analyses (refer to Rose #1 on page 18), the derailment site was determined to be the only plausible source of SO_2 above background. In general, a similar statement holds true for the glc's of THC as noted by Rose #4 on page 21. However the large instantaneous glc's of THC were directly attributed to the Ontario Provincial Police helicopter which landed between the MAM unit and the derailment site at approximately 1145 hours. This helicopter was less than 100 metres from the MAM unit.

Extremely low glc's of H_2S and O_3 were also detected during this monitoring period The maximum one-hour average glc of H_2S and O_3 were 0.001 ppm and 0.024 ppm (30% of the Criterion; 0.08 ppm) respectively.

With respect to the minisonde flights #2 and #3, the nocturnal inversion had dissipated by 0800 hours (Graphs #5 and #6) and the low level winds were 10 to 20 km/hr increasing to 45 km/hr at a height of 2 km. All winds were from the northwest throughout the lower 2 km.

Although low glc's of the primary contaminants were detected in the vicinity of the derailment site, the MAM unit was moved to the small town of Kilworth in order to determine if any remnants of these contaminants existed farther downwind of the derailment site. Kilworth is located along the banks of the Thames River, approximately 2 km SSE of the derailment site. Ambient air monitoring was initiated at 1213 hours at this monitoring site and the subsequent data analyses for this monitoring period (Hyde Park #4) are presented in the statistical summary Table #3 on page 14.

As anticipated (due to the NW winds; approximately 15 km/hr and the favourable atmospheric dispersion conditions; strong vertical mixing evidenced by many cumulus clouds) low glc's of $S0_2$, THC, H_2S and 0_3 were monitored at this site. The maximum one-hour average glc's of $S0_2$, THC, H_2S and 0_3 monitored at this site were 0.012 ppm 0.099 ppm, 0.001 ppm and 0.033 ppm respectively. The wind frequency distribution and $S0_2$ concentration rose analyses (Rose #2 on page 19)clearly shows that this monitoring site was directly downwind of the derailment site. The concentration/time analyses for this monitoring period is shown in Graph #2 on page 16.

Around 14:00 hours, the MAM unit was positioned once again close to the derailment site. It was located on the London/Lobo township line, 0.1 km north of the Canadian National Railway tracks and approximately 0.4 km downwind of the derailment site. Upon arrival at this monitoring site, a fourth vertical sounding of the atmosphere was undertaken - refer to Graph #7 on page 27. The winds were found to be brisk (in excess of 25 km/hr) and unidirectional (NNW) above 500 metres and the temperature lapse rate was indicative of a single, well mixed air mass. Below 500 metres, the wind direction was consistent with the upper air flow but the speed was variable; indicitive of strong vertical mixing and orographic modification. A clearing trend was noted by the field personnel and another nocturnal inversion was forecasted for the night of June 10th and morning of June 11th.

Ambient air monitoring of the primary gaseous pollutants at this site was initiated at 1536 hours. Once again, low glc's of $S0_2$, THC, H_2S and 0_3 were detected. The maximum one-hour average glc of $S0_2$, THC, H_2S and 0_3 were 0.01 ppm, 1.09 ppm, 0.001 ppm and 0.004 ppm respectively.

At 1700 hours, F.N. Durham told the MAM personnel that the "lift" of the SO_2 derailed tanker would occur the following morning. Since the data acquisition system is fully automated and computer controlled, the MAM personnel took a break with the understanding that they would return to the MAM unit later in the evening to check the analytical instruments, or earlier on request from the regional office or the derailment site..

The MAM personnel received a call at 2200 hours again reaffirming the lift schedule for the next morning and returned to the MAM unit at 2230 hours to check on the instrumentation. Upon arrival, the MAM unit's electrical system had failed (for only approximately 15 minutes) and after correcting the fault, the system was brought back on line at 2300 hours. The winds were calm (less than 5 km/hr) with a WSW component and genesis of a nocturnal inversion was evident - refer to wind frequency distribution rose, Rose #6 on page 23.

At 2310 hours, word was given to the MAM personnel that the "lift" would take place immediately.

Given this very short notice, no minisonde flight could be undertaken nor could the MAM unit be positioned downwind of the derailment site. All that could be done was to monitor the ground-base meteorological conditions and contaminants.

The "lift" operation lasted for approximately 30 minutes and was finished by 2345 hours. Low glc's of SO_2, THC, H_2S and O_3 were detected during this time. The maximum instantaneous SO_2 glc was 0.013 ppm - refer to monitoring period Hyde Park #5/6.

The emergency ambient air monitoring programme was terminated at 2351 hours.

APPENDIX

1.	Statistical Summary Table	Table #3
2.	Concentration/time analyses	
	Hyde Park #1/3-$S0_2$,H_2S,TH-M	Graph #1
	Hyde Park #4 - $S0_2$,H_2S,TH-M	Graph #2
	Hyde Park #5/6 - $S0_2$,H_2S,TH-m	Graph #3
3.	Wind frequency distribution and concentration roses	
	Hyde Park #1/3 - $S0_2$	Rose #1
	Hyde Park #4 - $S0_2$	Rose #2
	Hyde Park #5/6 - $S0_2$	Rose #3
	Hyde Park #1/3 - THC	Rose #4
	Hyde Park #5/6 - THC	Rose #5
	Hyde Park #6 - Wind only	Rose #6
4.	Upper air wind/temperature profiles	
	Minisonde flight #1	Graph #4
	Minosonde flight #2	Graph #5
	Minisonde flight #3	Graph #6
	Minisonde flight #4	Graph #7
5.	One-hour average ground level concentrations	
	- Statistical printouts.	

TABLE # 3 AMBIENT AIR SURVEY IN LONDON Units - PPM

GROUND LEVEL CONCENTRATIONS IN THE VICINITY OF CP TRAIN DERAILMENT

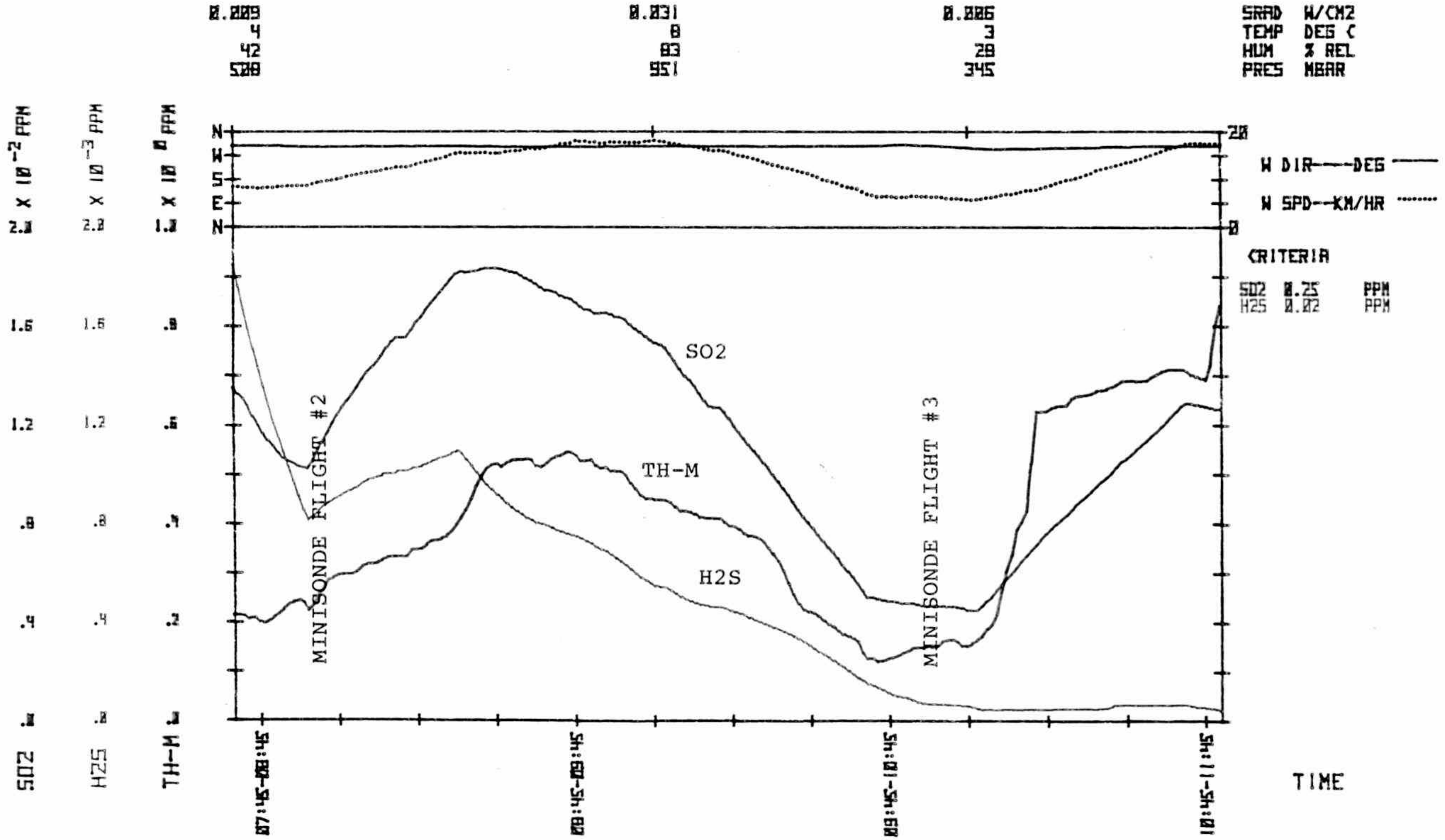
MONITORING LOCATION / NUMBER	DATE	MONITORING TIME START / END	INSTANTANEOUS CONCENTRATION				MAXIMUM 60-MINUTE AVERAGE CONCENTRATION		MONITORING PERIOD AVERAGE CONCENTRATION		SCAN TIME
			SO_2		THC						
	JUNE		Min.	Max.	Min.	Max.	SO_2	THC	SO_2	THC	Min.
HYDE PARK #1/3	10	0740 - 1146	0.001	0.049	0.001	8.15	0.018	0.601	0.012	0.424	1
HYDE PARK #4	10	1213 - 1358	0.007	0.015	0.001	2.09	0.012	0.099	0.011	0.082	1
HYDE PARK #5/6	10	1536 - 2351	0.001	0.013	0.001	9.37	0.010	1.090	0.008	0.323	1
			H_2S		O_3		H_2S	O_3	H_2S	O_3	
HYDE PARK #1/3	10	0740 - 1146	0.001	0.007	0.001	0.042	0.001	0.024	0.001	0.017	1
HYDE PARK #4	10	1213 - 1358	0.001	0.001	0.017	0.042	0.001	0.033	0.001	0.031	1
HYDE PARK #5/6	10	1536 - 2351	0.001	0.003	0.001	0.653	0.001	0.041	0.001	0.034	1

COMMENTS;

HYDE PARK #1/3

07:40 JUN 10 1980 SCAN= 60 SEC AVE= 60 MIN

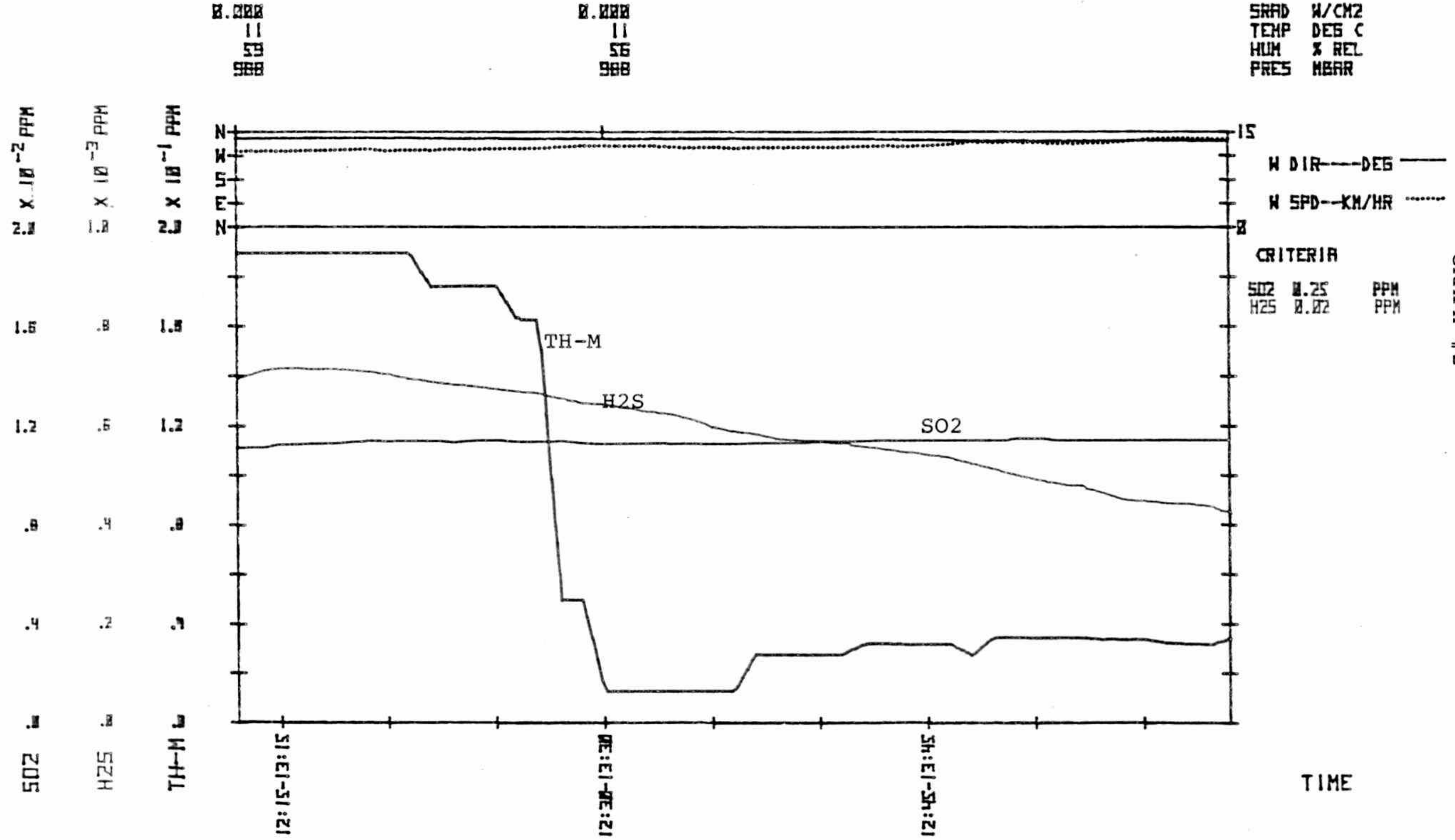
DWNWD CRASH SITE (X6840-Y5815); 0.15KM & 130 DEG/SITE



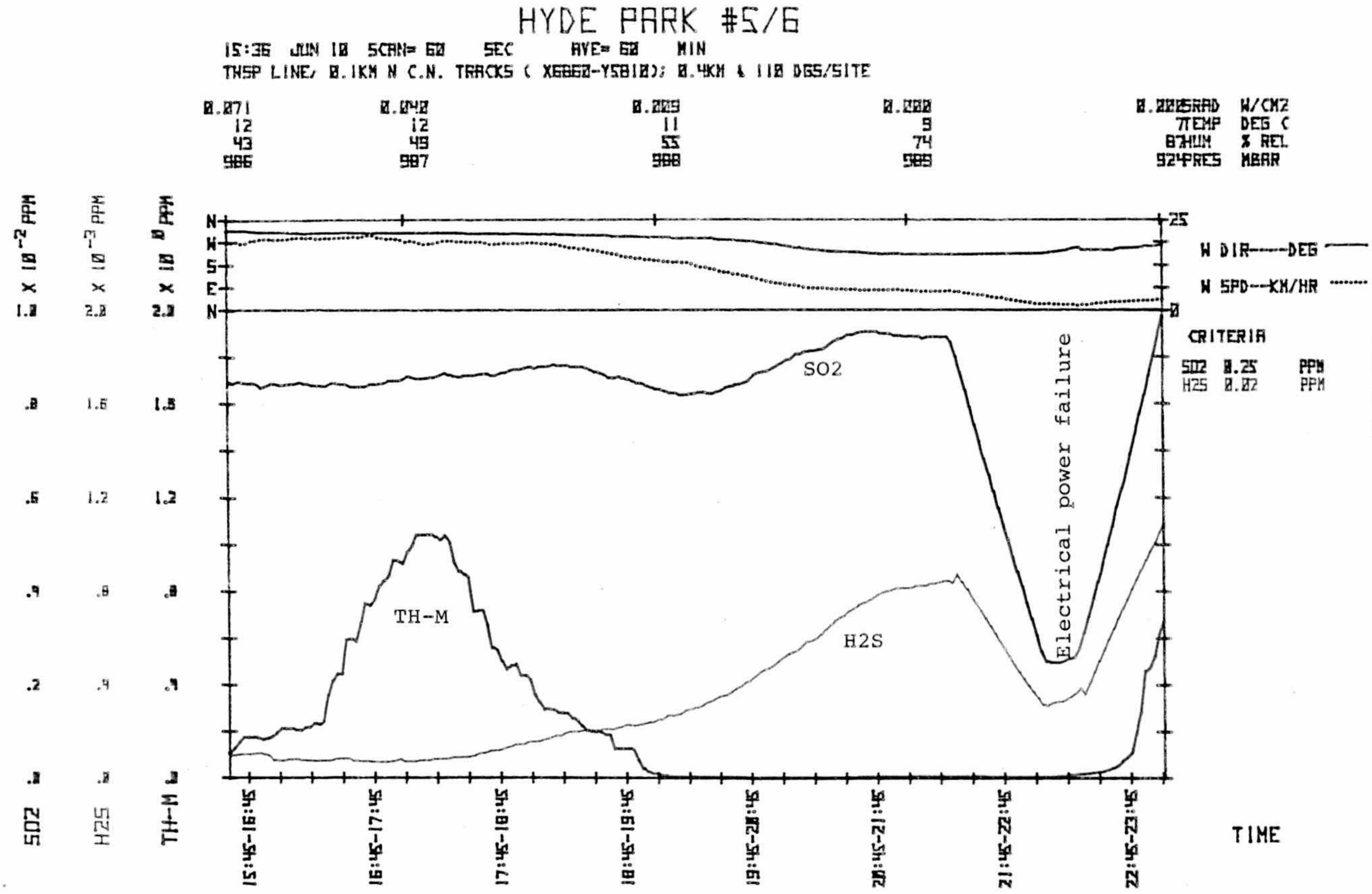
GRAPH #1

HYDE PARK #4

12:13 JUN 10 1980 SCAN= 60 SEC AVE= 60 MIN
CRESCENT IN KILWORTH (X6915-Y5675); 1.8KM & 150 DEG/SITE



GRAPH #2

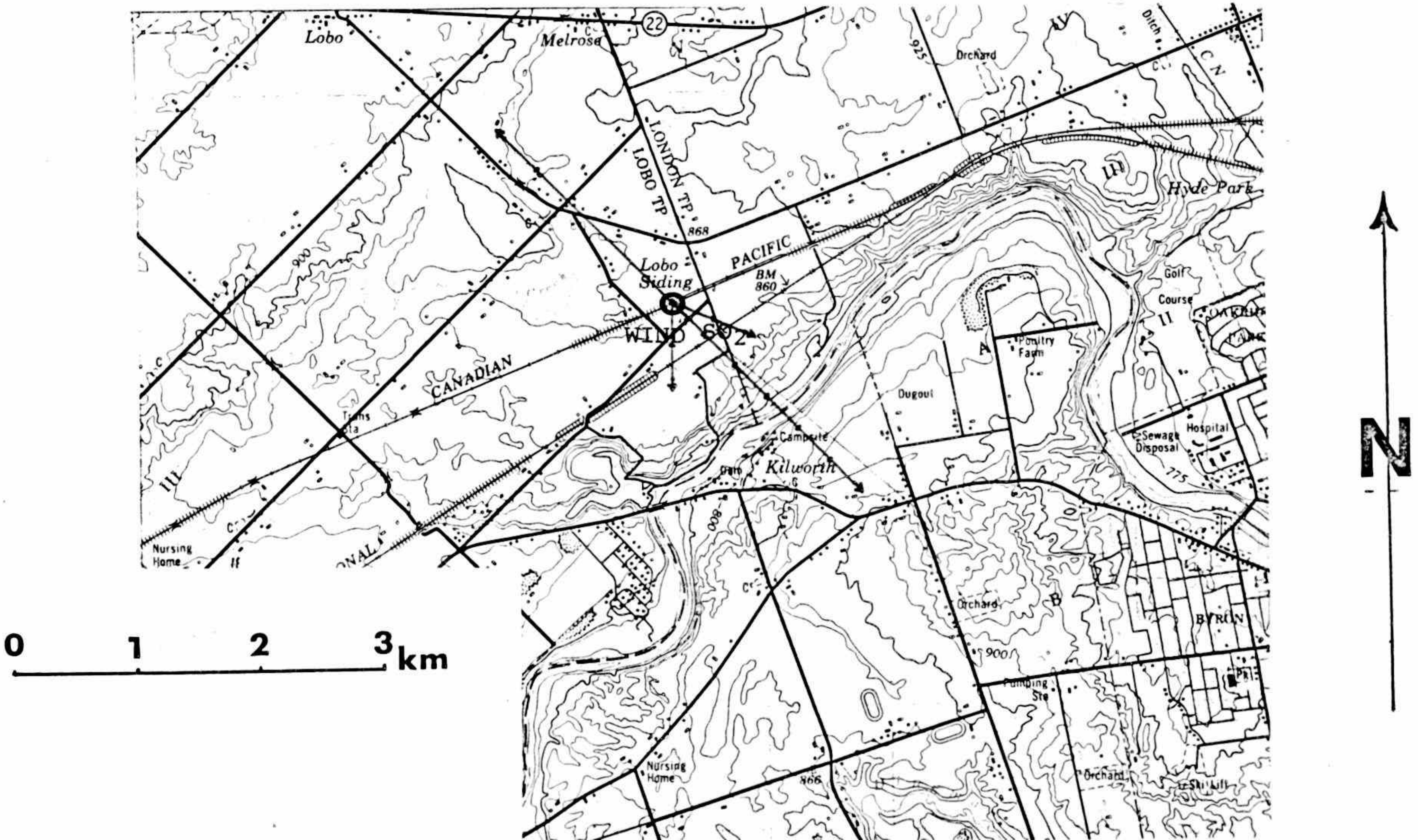

HYDE PARK #5/6
15:36 JUN 10 SCAN= 60 SEC AVE= 60 MIN
THSP LINE, 0.1KM N C.N. TRACKS (X6860-Y5810); 0.4KM & 110 DGS/SITE
0.071 12 43 986
0.040 12 49 987
0.009 11 55 988
0.000 9 74 989
0.000SRAD W/CM2
7TEMP DEG C
87HUM % REL
924PRES MBAR
N
W
S
E
N
25
0
W DIR-----DEG
W SPD---KM/HR
CRITERIA
SO2 0.25 PPM
H2S 0.02 PPM
X 10^-2 PPM
X 10^-3 PPM
X 10^0 PPM
1.0 2.0 2.0
.8 1.6 1.6
.6 1.2 1.2
.4 .8 .8
.2 .4 .4
.0 .0 .0
SO2
H2S
TH-M
SO2
H2S
TH-M
Electrical power failure
15:45-16:45
16:45-17:45
17:45-18:45
18:45-19:45
19:45-20:45
20:45-21:45
21:45-22:45
22:45-23:45
TIME

GRAPH #3

```
                    HYDE PARK #1/3

07:40  JUN 10 1980              SCAN= 60    SEC      AVE= 30    MIN
LENGTH= 4.1    HRS              MINIMUM MEAN= 1.00000E-03   PPM
DELAY=  0      MIN              WIND RANGE= 0    , 15    KM/HR
LOC: DNWND CRASH SITE (X6840-Y5815); 0.15KM & 130 DGS/SITE

               ARITHMETIC MEAN: SO2
               1 DIV= 0.01       PPM
               PREVAILING WINDS; BLOWING TOWARDS:
               1 DIV= 10    %
```

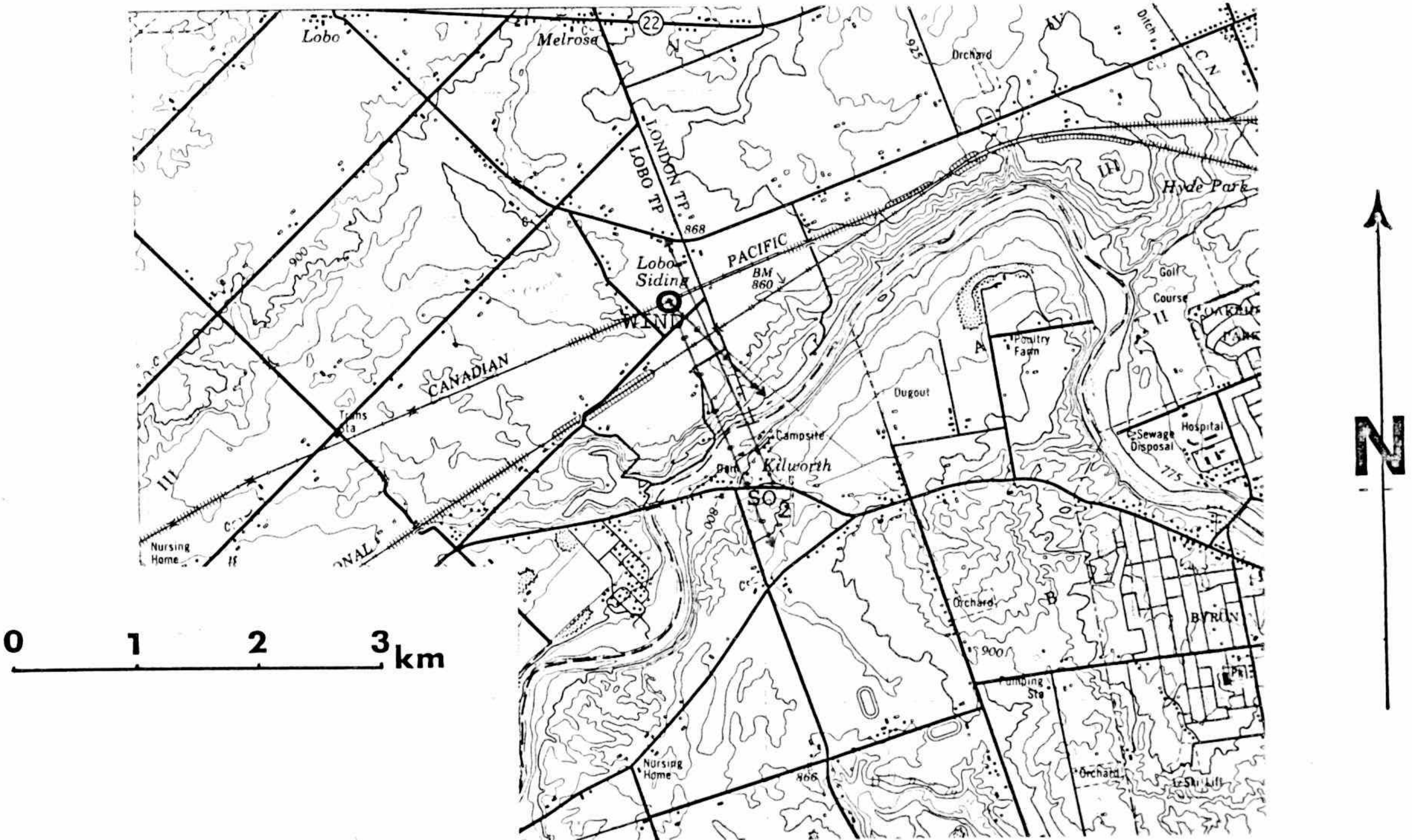


ROSE #1

```
                    HYDE PARK #4

12:13  JUN 10 1980           SCAN= 60    SEC     AVE= 30    MIN
LENGTH= 1.7   HRS            MINIMUM MEAN= 1.00000E-03   PPM
DELAY=  0     MIN            WIND RANGE= 0    , 20    KM/HR
LOC: CRESCENT IN KILWORTH (X6915-Y5675); 1.8KM & 150 DEG/SITE

              ARITHMETIC MEAN: SO2
              1 DIV= 0.01      PPM
              PREVAILING WINDS; BLOWING TOWARDS:
              1 DIV= 10     %
```

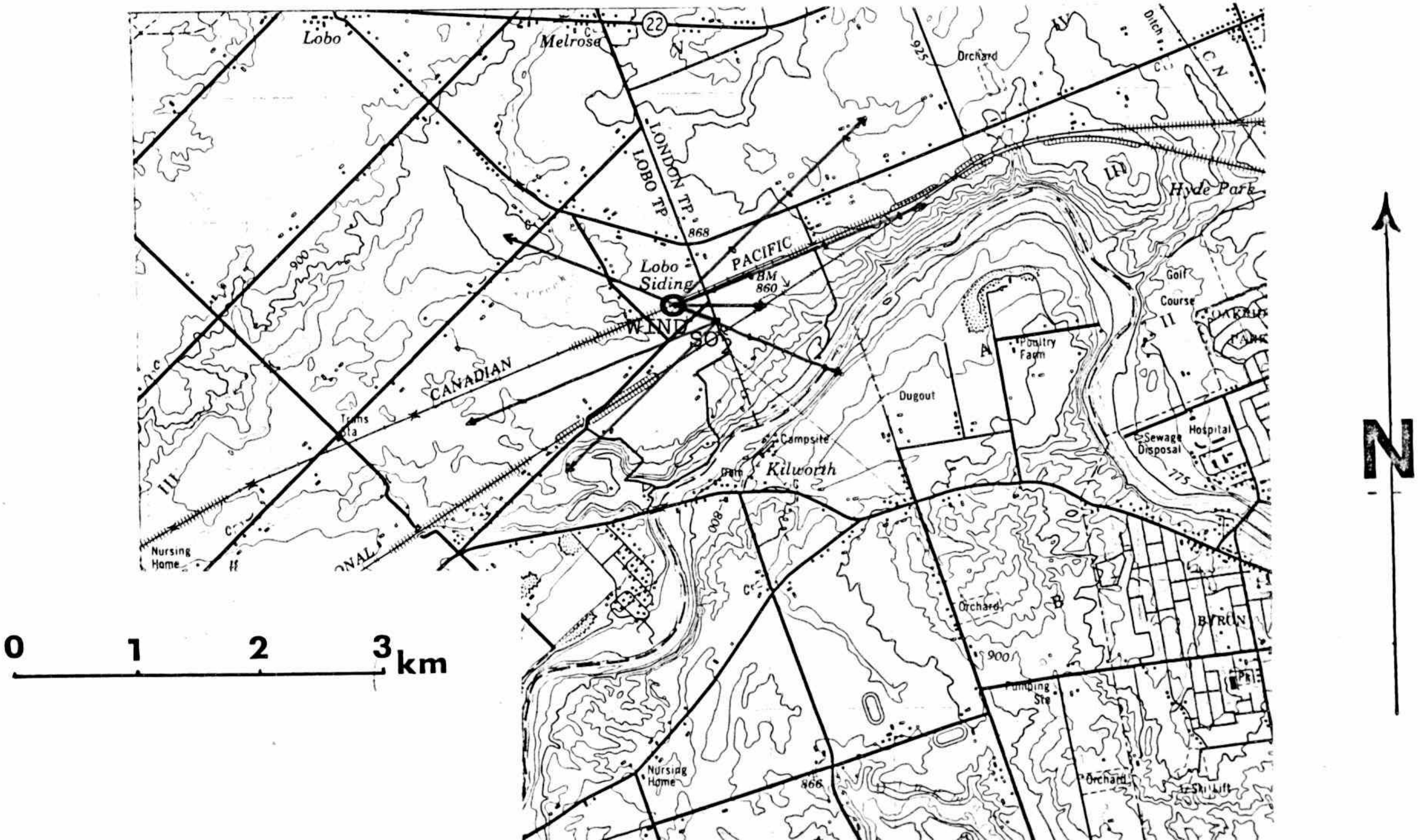


ROSE #2

HYDE PARK #5/6

```
15:36  JUN 10  SCAN= 60    SEC      AVE= 30    MIN
LENGTH= 8.4   HRS              MINIMUM MEAN= 1.00200E-03   PPM
DELAY=  0     MIN              WIND RANGE= 0    , 15    KM/HR
LOC: TWSP LINE/ 0.1KM N C.N. TRACKS ( X6860-Y5810); 0.4KM & 110 DGS/SITE

                 ARITHMETIC MEAN: SO2
                 1 DIV= 0.01      PPM
                 PREVAILING WINDS; BLOWING TOWARDS:
                 1 DIV= 10     %
```

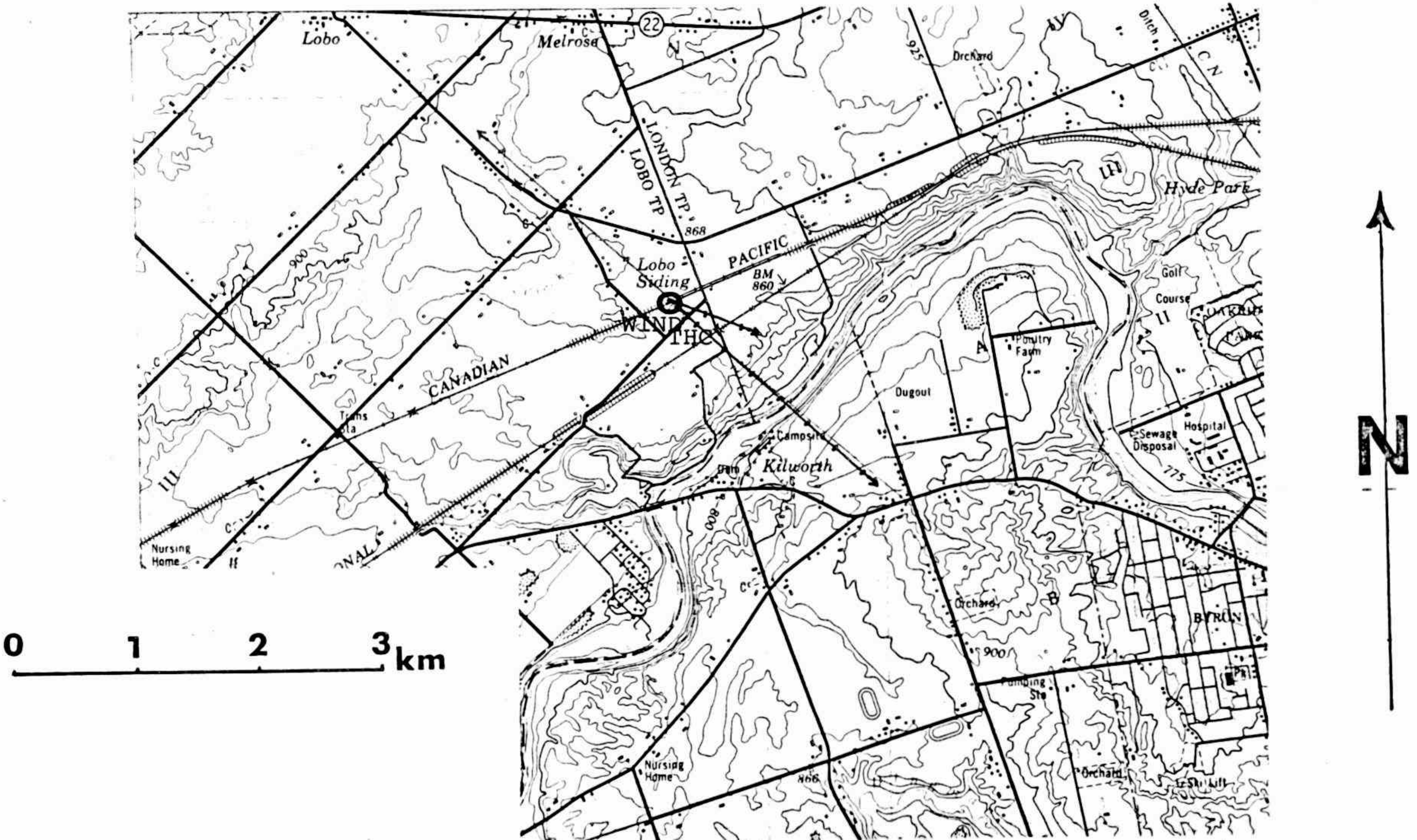


ROSE #3

HYDE PARK #1/3

```
07:40  JUN 10 1980              SCAN= 60    SEC     AVE= 60     MIN
LENGTH= 4.1   HRS               MINIMUM MEAN= 1.00000E-03   PPM
DELAY=  0     MIN               WIND RANGE= 0    , 30    KM/HR
LOC: DWNWD CRASH SITE (X6840-Y5815); 0.15KM & 130 DGS/SITE

                    ARITHMETIC MEAN: THC
                    1 DIV= 0.1    PPM
                    PREVAILING WINDS; BLOWING TOWARDS:
                    1 DIV= 10     %
```

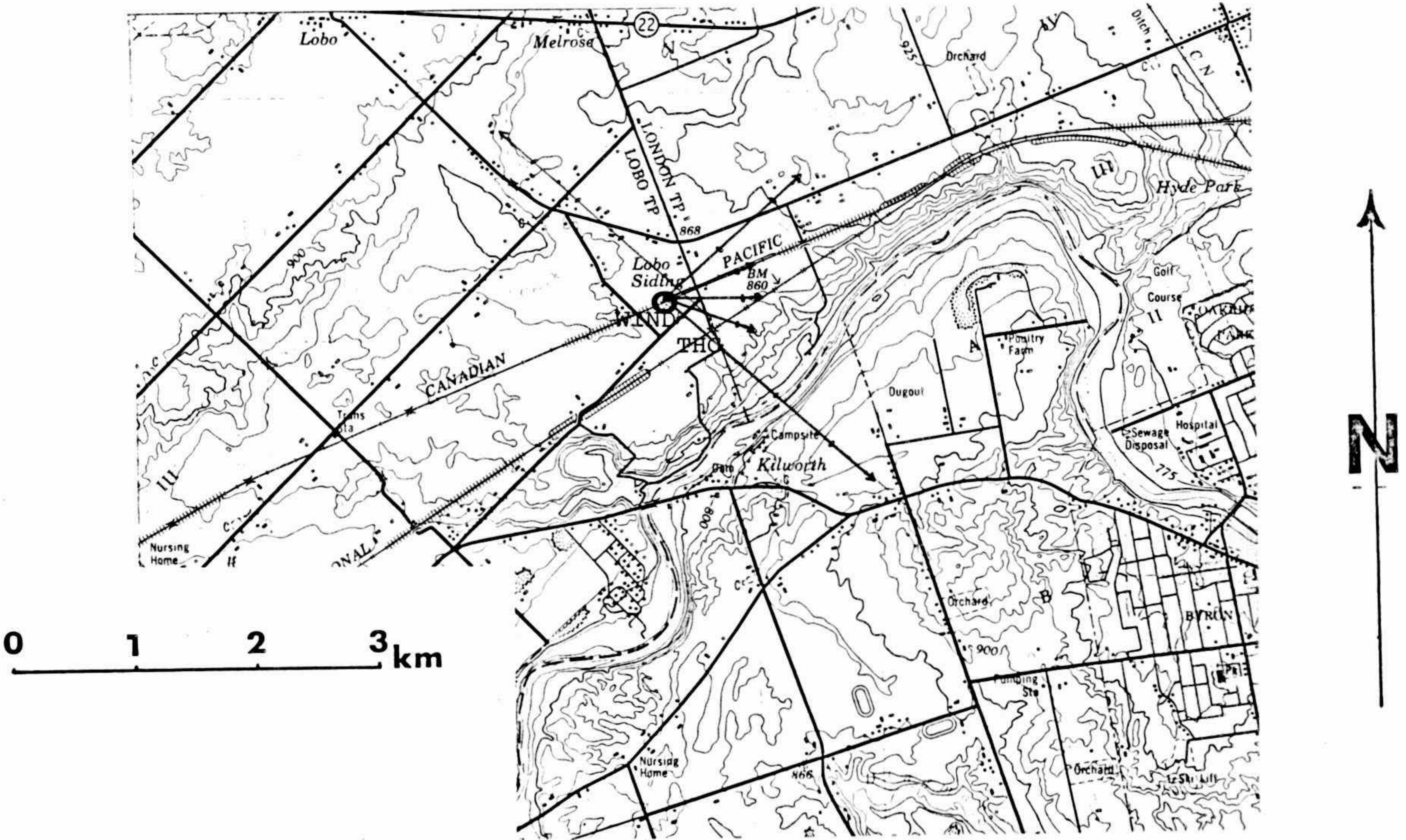


ROSE #4

HYDE PARK #5/6

```
15:36  JUN 10  SCAN= 60     SEC        AVE= 60     MIN
LENGTH= 8.4   HRS                 MINIMUM MEAN= 1.00000E-03   PPM
DELAY=  0     MIN                 WIND RANGE= 0    , 30    KM/HR
LOC: TWSP LINE, 0.1KM N C.N. TRACKS ( X6860-Y5810); 0.4KM & 110 DGS/SITE

                ARITHMETIC MEAN: THC
                1 DIV= 0.1    PPM
                PREVAILING WINDS; BLOWING TOWARDS:
                1 DIV= 10     %
```

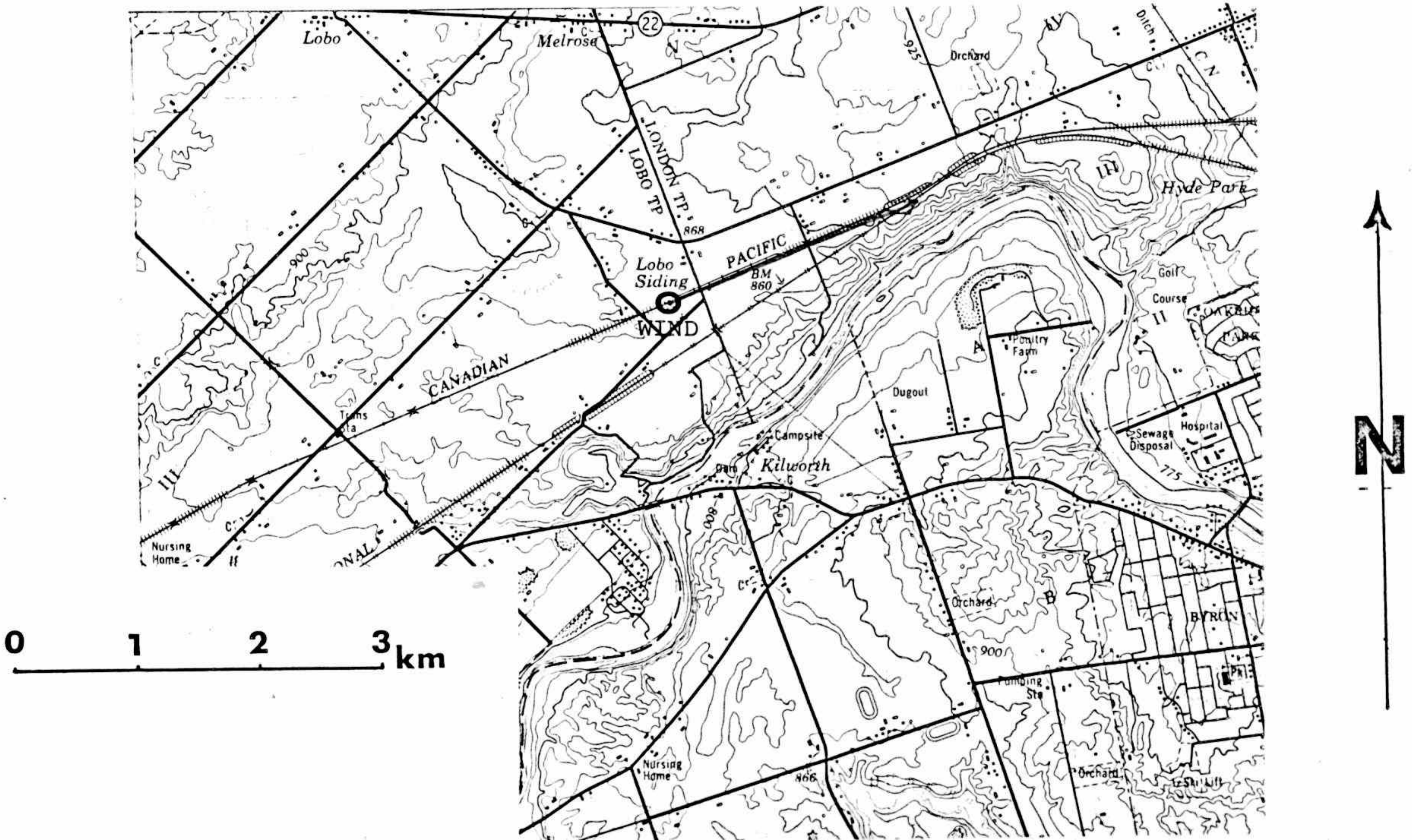


ROSE #5

HYDE PARK #6

```
23:05  JUN 10 1980            SCAN= 60    SEC      AVE= 30    MIN
LENGTH= 0.5   HRS             MINIMUM MEAN= 1.00000E-03   PPM
DELAY=  0     MIN             WIND RANGE= 0    , 10    KM/HR
LOC: TWSP LINE, 0.1KM N. C.N. TRACKS (X6860-Y5810)
```

```
PREVAILING WINDS; BLOWING TOWARDS:
1 DIV= 100   %
```



ROSE #6

GRAPH #4

```
                        +++ THEODOLITE REPORT +++

NAME:  FLIGHT #1                     FILE:  1
LOC:   M.T.C. GARAGE (X6830-Y5895); 1KM & 60DGS/SITE
MET:   CLEAR, HIGH PRESSURE NORTHERLY WINDS - 330DGS
TIME:    06:10:06:56:14              TEMP:  7.61
B/L:    50   M,  80   DEG            ELEV:  300


 TIME HEIGHT  -WIND  DIRECTION-  -WIND SPEED-km/hr-      ---TEMPERATURE--DEG C---
 sec      M   N . E . S . W . N  0             95  -55                     35

  540   1782              +          *                          +
  525   1733              +          *                          +
  510   1683              +          *                           +
  495   1634              +          *                                +
  480   1584             +            *                           +
  465   1535             +            *
  450   1485              +           *                     +
  435   1436              +          *                         +
  420   1386              +           *                        +
  405   1337              +           *                        +
  390   1287              +           *                         +
  375   1238              +                                     +
  360   1188              +          *                          +
  345   1139             +            *                         +
  330   1089              +              *                      +
  315   1040              +            *                        +
  300    990              +           *                         +
  285    941              +              *                      +
  270    891              +          *                          +
  255    842              +              *                      +
  240    792              +         *                           +
  225    743              +             *                       +
  210    693              +         *                           +
  195    644               +           *                            +
  180    594               +        *                                   +
  165    545               +          *                                 +
  150    495               +           *                                +
  135    446               +        *                                +
  120    396               +         *                                +
  105    347               +         *                                +
   90    297               +         *                           +
   75    248               +        *                            +
   60    198               +       *                               +
   45    149               +         *                           +
   30     99             +      *                                +
   15     50              +     *                                +
```

GRAPH #5

```
NAME: FLIGHT #2                         FILE:  2
LOC:  DNWD CRASH SITE (X6840-Y5815); 0.15KM & 130 DGS/SITE
MET:  CLEAR, BRISK NW WINDS
TIME:  06:10:08:04:08                   TEMP:  10.68
B/L:  40   M,   335  DEG                ELEV:  50


 TIME HEIGHT  -WIND  DIRECTION-  -WIND SPEED-km/hr-     ---TEMPERATURE--DEG-C---
  sec     M   N . E . S . W . N  0             640   -25                       25

  645   2129                +       *                  +
  630   2079                +        *                                   +
  615   2030                +       *                                  +
  600   1980                +        *                               +
  585   1931        +                    *                           +
  570   1881      +               *                                  +
  555   1832                +         *                                      +
  540   1782                +       *                                   +
  525   1733                +      *                                       +
  510   1683                +        *                               +
  495   1634                +        *                                +
  480   1584                +            *                            +
  465   1535         +            *                                   +
  450   1485                +         *                               +
  435   1436                +                                         +
  420   1386                +        *                                +
  405   1337                +       *                                 +
  390   1287                +                                         +
  375   1238                +       *                                 +
  360   1188                +       *                                 +
  345   1139                +       *                                 +
  330   1089                +       *                                 +
  315   1040                +       *                                 +
  300    990                +            *                            +
  285    941                +       *                                 +
  270    891                +       *                                 +
  255    842                +       *                                 +
  240    792                +       *                                 +
  225    743                +       *                                 +
  210    693                +       *                                 +
  195    644                 +      *                                 +
  180    594                 +        *                               +
  165    545                 +         *                              +
  150    495                 +       *                                +
  135    446                 +       *                                +
  120    396                +        *                                +
  105    347                 +      *                                 +
   90    297                 +     *                                  +
   75    248                 +    *                                   +
   60    198                +     *                                   +
   45    149                +     *                                    +
   30     99                +     *                                    +
   15     50                +      *                                   +
```

GRAPH #6

```
                              +++ THEODOLITE REPORT +++

NAME: FLIGHT #3                         FILE:  4
LOC:  TWSP LINE, 0.1KM N C.N. TRACKS (X6860-Y5810); 0.4KM & 110 DGS/SITE
MET:  CUMULUS CLOUD COVER & SQUALLS - PRECIP.
TIME:   06:10:10:27:03                  TEMP:  12.97
B/L:   30   M,  60   DEG                ELEV:  50

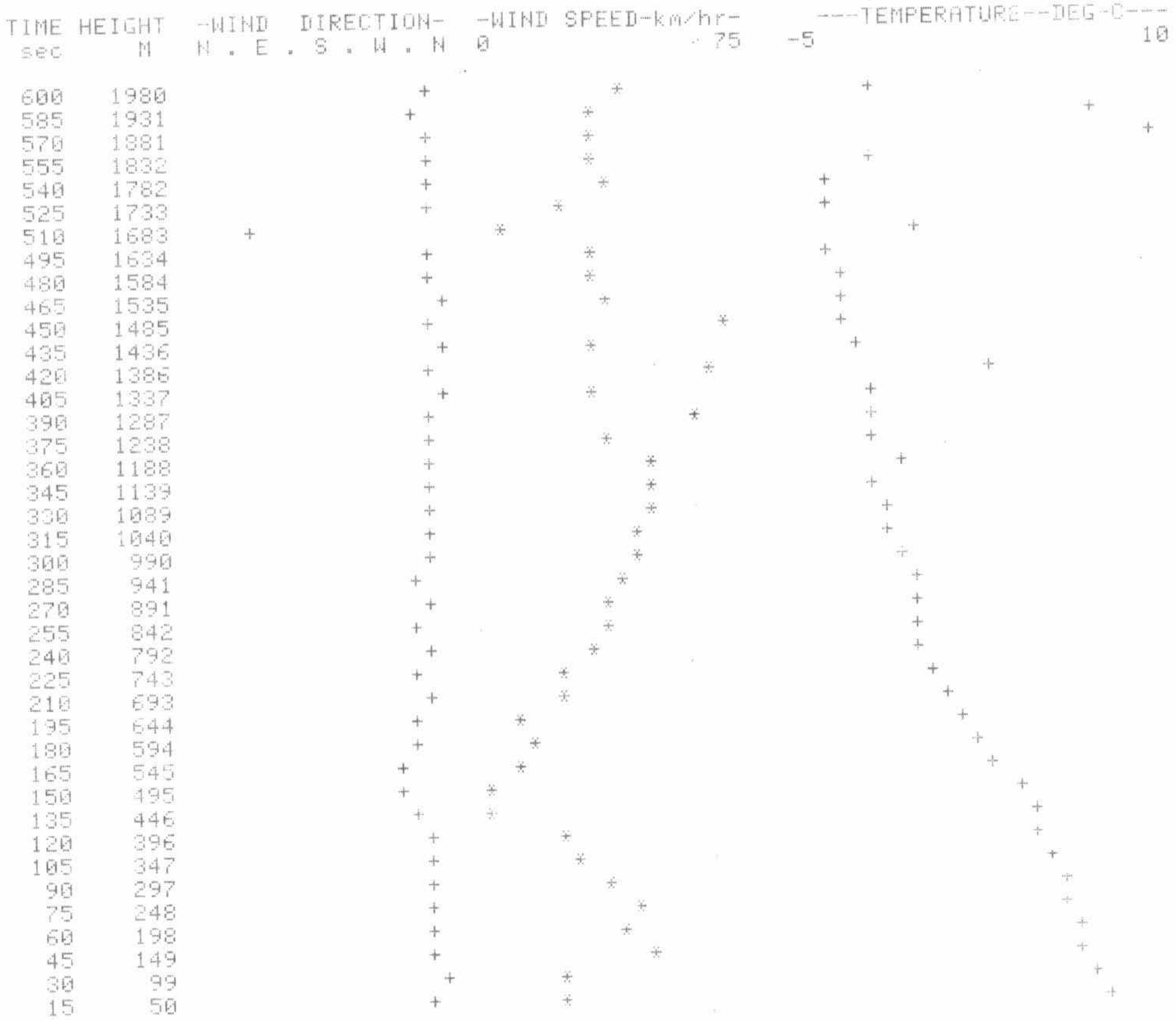

 TIME HEIGHT  -WIND  DIRECTION-  -WIND SPEED-km/hr-     ---TEMPERATURE--DEG-C---
  sec     M   N . E . S . W . N  0              45

  285    941                +                    *
  270    891                +              *
  255    842                 +                 *
  240    792                 +            *
  225    743                 +                *
  210    693                 +            *
  195    644                 +              *
  180    594                 +                 *
  165    545                 +             *
  150    495                 +               *
  135    446                  +       *
  120    396                 +          *
  105    347                 +           *
   90    297                  +        *
   75    248                 +        *
   60    198                 +         *
   45    149                 +           *
   30     99                 +            *
   15     50                 +          *
```

GRAPH #7

```
                    +++ THEODOLITE REPORT +++

NAME: FLIGHT #4                          FILE:  6
LOC:  TWSF LINE, -.1KM N C.N. TRACKS (X6860-Y5810); 0.4KM @ 110 DGS/SITE
MET:  CLEARING TREND, BRISK NORTHERLY WINDS, ALTOCUMULUS
TIME:    06:10:14:41:25                  TEMP:  10.94
B/L:   65   M,  85   DEG                 ELEV:  50
```



```
                              HYDE PARK #1/3

DATE:              JUN 10 1980
SCAN TIME:         60     SEC
AVERAGING TIME:    60     MIN
LOCATION: DWNWD CRASH SITE (X6840-Y5815); 0.15KM & 130 DGS/SITE

       TIME               H2S             THC              SO2            THC-CH4
                          CH4            OZONE          SOLAR RAD          TEMP
                       HUMIDITY        BAROMETER        WIND SPEED     WIND DIRECTI

07:40----08:40          1.8E-03         2.9E-01          1.4E-02          2.1E-01
                        2.6E-02         1.1E-02          8.9E-03             4
                          42              508               8               308

07:43----08:43          1.6E-03         2.3E-01          1.3E-02          2.0E-01
                        2.1E-02         1.1E-02          8.2E-03             4
                          43              508               8               309

07:46----08:46          1.3E-03         2.2E-01          1.2E-02          2.0E-01
                        1.6E-02         1.1E-02          7.3E-03             4
                          43              508               8               307

07:49----08:49          1.1E-03         2.3E-01          1.1E-02          2.2E-01
                        1.6E-02         1.1E-02          6.5E-03             4
                          44              508               8               306

07:52----08:52          9.2E-04         2.6E-01          1.0E-02          2.4E-01
                        1.9E-02         1.1E-02          6.1E-03             4
                          45              508               9               304

07:55----08:55          8.2E-04         3.0E-01          1.1E-02          2.3E-01
                        2.3E-02         1.2E-02          6.1E-03             4
                          47              525               9               303

07:58----08:58          8.8E-04         3.3E-01          1.2E-02          2.8E-01
                        2.6E-02         1.3E-02          6.6E-03             4
                          52              574              10               303

08:01----09:01          9.2E-04         3.4E-01          1.3E-02          2.9E-01
                        2.6E-02         1.3E-02          7.5E-03             5
                          57              623              10               303

08:04----09:04          9.5E-04         3.6E-01          1.4E-02          3.1E-01
                        2.6E-02         1.5E-02          8.8E-03             5
                          61              672              11               304

08:07----09:07          9.8E-04         3.6E-01          1.4E-02          3.2E-01
                        2.6E-02         1.6E-02          9.9E-03             5
                          66              721              12               304

08:10----09:10            1.0E-03         3.7E-01          1.5E-02          3.3E-01
                        2.6E-02         1.7E-02          1.1E-02             6
                          71              771              12               305

08:13----09:13          1.0E-03         3.7E-01          1.6E-02          3.3E-01
                        2.6E-02         1.7E-02          1.2E-02             6
                          72              787              13               305
```

```
HYDE PARK #1/3, CONT'D                                          PAGE 2

        TIME            H2S            THC            SO2           THC-CH4
                        CH4           OZONE        SOLAR RAD         TEMP
                     HUMIDITY       BAROMETER      WIND SPEED    WIND DIRECTI

08:16----09:16        1.0E-03        3.9E-01        1.6E-02        3.5E-01
                      2.8E-02        1.8E-02        1.3E-02           6
                        77             836            13             306

08:19----09:19        1.1E-03        3.9E-01        1.7E-02        3.7E-01
                      2.8E-02        1.9E-02        1.5E-02           7
                        81             885            14             306

08:22----09:22        1.1E-03        4.1E-01        1.8E-02        3.9E-01
                      2.8E-02        2.1E-02        1.8E-02           7
                        85             934            15             306

08:25----09:25        1.0E-03        4.5E-01        1.8E-02        4.4E-01
                      3.1E-02        2.1E-02        2.0E-02           7
                        87             951            15             304

08:28----09:28        9.5E-04        5.1E-01        1.8E-02        5.1E-01
                      3.6E-02        2.1E-02        2.2E-02           7
                        87             951            15             303

08:31----09:31        9.0E-04        5.2E-01        1.8E-02        5.1E-01
                      3.8E-02        2.1E-02        2.4E-02           8
                        86             951            16             302

08:34----09:34        8.4E-04        5.4E-01        1.8E-02        5.3E-01
                      3.8E-02        2.2E-02        2.7E-02           8
                        85             951            16             303

08:37----09:37        8.0E-04        5.3E-01        1.8E-02        5.2E-01
                      3.8E-02        2.1E-02        2.7E-02           8
                        85             951            16             303

08:40----09:40        7.8E-04        5.0E-01        1.7E-02        5.2E-01
                      3.3E-02        2.1E-02        2.7E-02           8
                        84             951            17             303

08:43----09:43        7.5E-04        5.3E-01        1.7E-02        5.4E-01
                      3.2E-02        2.2E-02        2.7E-02           8
                        84             951            18             302

08:46----09:46        7.3E-04        5.2E-01        1.7E-02        5.2E-01
                      2.9E-02        2.2E-02        2.7E-02           8
                        84             951            18             303

08:49----09:49        7.0E-04        5.0E-01        1.7E-02        5.1E-01
                      2.7E-02        2.2E-02        2.8E-02           8
                        84             951            18             303

08:52----09:52        6.6E-04        4.8E-01        1.6E-02        5.0E-01
                      2.5E-02        2.2E-02        2.8E-02           8
                        84             951            18             304

08:55----09:55        6.2E-04        4.4E-01        1.6E-02        4.9E-01
                      2.0E-02        2.2E-02        2.9E-02           8
                        84             951            18             305
```

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HYDE PARK #1/3, CONT'D                                                    PAGE 3

        TIME              H2S              THC              SO2            THC-CH4
                          CH4             OZONE          SOLAR RAD          TEMP
                        HUMIDITY        BAROMETER        WIND SPEED     WIND DIRECTI

08:58-----09:58         5.6E-04          4.2E-01          1.6E-02          4.5E-01
                        1.7E-02          2.3E-02          3.0E-02             8
                          84               951              18               305

09:01-----10:01         5.3E-04          4.1E-01          1.5E-02          4.4E-01
                        1.7E-02          2.3E-02          3.2E-02             8
                          83               951              18               306

09:04-----10:04         5.1E-04          4.0E-01          1.5E-02          4.3E-01
                        1.7E-02          2.2E-02          3.1E-02             8
                          80               918              17               306

09:07-----10:07         4.8E-04          4.0E-01          1.4E-02          4.2E-01
                        1.7E-02          2.1E-02          3.0E-02             8
                          75               869              17               306

09:10-----10:10         4.6E-04          3.9E-01          1.3E-02          4.1E-01
                        1.7E-02          2.0E-02          2.9E-02             7
                          71               820              16               305

09:13-----10:13         4.5E-04          3.9E-01          1.3E-02          4.1E-01
                        1.7E-02          2.0E-02          2.9E-02             7
                          69               804              16               305

09:16-----10:16         4.3E-04          3.7E-01          1.2E-02          3.9E-01
                        1.5E-02          1.8E-02          2.7E-02             7
                          64               754              15               305

09:19-----10:19         4.0E-04          3.6E-01          1.1E-02          3.7E-01
                        1.5E-02          1.7E-02          2.5E-02             6
                          60               705              14               304

09:22-----10:22         3.8E-04          3.4E-01          1.0E-02          3.5E-01
                        1.5E-02          1.6E-02          2.3E-02             6
                          56               656              13               304

09:25-----10:25         3.5E-04          3.0E-01          9.4E-03          3.0E-01
                        1.2E-02          1.5E-02          2.0E-02             5
                          52               607              13               305

09:28-----10:28         3.2E-04          2.5E-01          8.5E-03          2.3E-01
                        6.6E-03          1.4E-02          1.7E-02             5
                          48               558              12               306

09:31-----10:31         2.8E-04          2.3E-01          7.7E-03          2.1E-01
                        5.0E-03          1.3E-02          1.4E-02             4
                          44               508              11               306

09:34-----10:34         2.4E-04          2.1E-01          7.0E-03          1.9E-01
                        5.0E-03          1.1E-02          1.1E-02             4
                          41               459              10               306

09:37-----10:37         2.0E-04          2.0E-01          6.1E-03          1.7E-01
                        5.0E-03          1.0E-02          9.7E-03             3
                          37               410               8               307
```

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HYDE PARK #1/3, CONT'D                                                    PAGE 4

         TIME              H2S              THC             SO2           THC-CH4
                           CH4             OZONE         SOLAR RAD         TEMP
                        HUMIDITY         BAROMETER      WIND SPEED     WIND DIRECTI

 09:40----10:40          1.5E-04          1.7E-01         5.3E-03         1.4E-01
                         4.3E-03          9.2E-03         9.4E-03            3
                           33               361              7              302

 09:43----10:43          1.2E-04          1.4E-01         5.0E-03         1.2E-01
                         3.2E-03          8.7E-03         9.5E-03            3
                           31               344              6              311

 09:46----10:46          9.1E-05          1.1E-01         4.9E-03         1.3E-01
                         2.5E-03          8.5E-03         9.6E-03            3
                           30               345              6              311

 09:49----10:49          7.8E-05          1.3E-01         4.8E-03         1.4E-01
                         3.4E-03          8.3E-03         9.4E-03            3
                           29               345              6              311

 09:52----10:52          5.9E-05          1.4E-01         4.7E-03         1.5E-01
                         5.6E-03          8.0E-03         8.5E-03            3
                           28               345              6              309

 09:55----10:55          5.5E-05          1.7E-01         4.7E-03         1.6E-01
                         5.7E-03          7.8E-03         7.4E-03            3
                           28               345              6              305

 09:58----10:58          5.1E-05          1.6E-01         4.6E-03         1.6E-01
                         5.7E-03          7.5E-03         6.5E-03            3
                           28               345              6              301

 10:01----11:01          4.3E-05          1.5E-01         4.5E-03         1.6E-01
                         5.7E-03          7.6E-03         5.8E-03            3
                           28               345              6              297

 10:04----11:04          3.4E-05          2.1E-01         4.9E-03         1.9E-01
                         8.2E-03          8.3E-03         5.9E-03            3
                           31               377              6              295

 10:07----11:07          3.4E-05          2.9E-01         5.7E-03         2.9E-01
                         1.8E-02          9.6E-03         7.0E-03            4
                           35               427              7              294

 10:10----11:10          3.4E-05          3.6E-01         6.4E-03         4.0E-01
                         2.0E-02          1.1E-02         7.9E-03            4
                           40               476              7              294

 10:13----11:13          3.4E-05          5.2E-01         7.1E-03         6.2E-01
                         2.3E-02          1.2E-02         8.6E-03            5
                           44               525              8              295

 10:16----11:16          3.6E-05          5.2E-01         7.8E-03         6.3E-01
                         2.3E-02          1.3E-02         9.4E-03            5
                           48               574              9              297

 10:19----11:19          3.7E-05          5.2E-01         8.4E-03         6.4E-01
                         2.3E-02          1.4E-02         1.0E-02            6
                           52               624             10              300
```

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HYDE PARK #1/3, CONT'D                                          PAGE 5

     TIME             H2S            THC           SO2          THC-CH4
                      CH4           OZONE       SOLAR RAD        TEMP
                    HUMIDITY      BAROMETER     WIND SPEED   WIND DIRECTI

10:22----11:22      3.7E-05        5.3E-01       9.0E-03       6.6E-01
                    2.3E-02        1.5E-02       1.2E-02          6
                      56             673           11            301

10:25----11:25      3.9E-05        5.4E-01       9.7E-03       6.7E-01
                    2.3E-02        1.7E-02       1.3E-02          6
                      60             722           12            302

10:28----11:28      5.3E-05        5.5E-01       1.0E-02       6.8E-01
                    2.3E-02        1.8E-02       1.5E-02          7
                      63             772           13            303

10:31----11:31      5.3E-05        5.5E-01       1.1E-02       6.8E-01
                    2.3E-02        1.9E-02       1.7E-02          7
                      67             821           14            304

10:34----11:34      5.3E-05        5.5E-01       1.1E-02       6.8E-01
                    2.3E-02        2.1E-02       1.8E-02          8
                      71             870           15            307

10:37----11:37      5.3E-05        5.5E-01       1.2E-02       7.1E-01
                    2.3E-02        2.2E-02       2.0E-02          8
                      74             919           16            307

10:40----11:40      5.5E-05        5.5E-01       1.3E-02       7.1E-01
                    2.3E-02        2.3E-02       2.2E-02          9
                      77             969           17            308

10:43----11:43      4.6E-05        5.4E-01       1.3E-02       6.9E-01
                    2.3E-02        2.4E-02       2.2E-02          9
                      79             985           18            308

10:46----11:46      3.9E-05        6.0E-01       1.3E-02       7.0E-01
                    2.2E-02        2.4E-02       2.5E-02          9
                      79             985           18            309
```

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                              STATISTICS

NUMBER OF READINGS 248

POLLUTANT            MINIMUM   MAXIMUM   ARITHMETIC  STANDARD GEOMETRIC GEOMETRIC
                     VALUE     VALUE     MEAN       DEVIATION  MEAN      STD. DEV.

H2S                 1.00E-06  7.15E-03  6.84E-04  1.34E-03  3.01E-05  2.95E+01
THC                 1.00E-06  8.15E+00  4.24E-01  8.71E-01  9.79E-04  7.16E+02
SO2                 1.00E-06  4.85E-02  1.22E-02  9.62E-03  1.04E-03  7.95E+01
THC-CH4             1.00E-06  7.05E+00  4.33E-01  8.70E-01  2.28E-03  5.99E+02
CH4                 1.00E-06  3.86E-01  2.10E-02  5.51E-02  1.04E-05  9.65E+01
OZONE               1.00E-06  4.21E-02  1.67E-02  1.17E-02  1.33E-03  9.23E+01
SOLAR RAD           1.00E-06  7.13E-02  1.76E-02  1.70E-02  1.25E-03  9.07E+01
TEMP                       0        11         6         4
HUMIDITY                   0        96        60        38         0      3720
BAROMETER                  0       986       706       444         3     11375
WIND SPEED                 0        34        13         9         0      1835

                     MAXIMUM
                     AVERAGE

H2S                 1.84E-03
THC                 6.01E-01
SO2                 1.83E-02
THC-CH4             7.09E-01
CH4                 3.81E-02
OZONE               2.42E-02
SOLAR RAD           3.16E-02
TEMP                       9
HUMIDITY                  87
BAROMETER                985
WIND SPEED                18
WIND DIRECTION           311
```

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                                HYDE PARK #4

DATE:               JUN 10 1980
SCAN TIME:          60     SEC
AVERAGING TIME:     60     MIN
LOCATION: CRESCENT IN KILWORTH (X6915-Y5675); 1.8KM & 150 DGS/SITE

       TIME            H2S             THC             SO2          THC-CH4
                       CH4            OZONE         SOLAR RAD        TEMP
                     HUMIDITY       BAROMETER      WIND SPEED    WIND DIRECTI

12:13----13:13       6.9E-04         9.8E-02         1.1E-02         1.9E-01
                     9.7E-03         2.9E-02         3.9E-05           11
                       59              988             12              335

12:16----13:16       7.1E-04         9.2E-02         1.1E-02         1.9E-01
                     9.7E-03         3.0E-02         4.0E-05           11
                       59              988             12              336

12:19----13:19       7.1E-04         8.7E-02         1.1E-02         1.9E-01
                     9.7E-03         3.0E-02         3.9E-05           11
                       58              988             12              337

12:22----13:22       6.9E-04         8.7E-02         1.1E-02         1.8E-01
                     6.4E-03         3.0E-02         3.6E-05           11
                       57              988             12              336

12:25----13:25       6.7E-04         9.1E-02         1.1E-02         1.8E-01
                     6.4E-03         3.0E-02         3.4E-05           11
                       57              988             12              335

12:28----13:28       6.5E-04         9.0E-02         1.1E-02         4.9E-02
                     1.0E-06         3.0E-02         3.2E-05           11
                       56              988             13              334

12:31----13:31       6.3E-04         9.0E-02         1.1E-02         1.2E-02
                     1.0E-06         3.1E-02         2.9E-05           11
                       56              988             13              334

12:34----13:34       6.1E-04         9.0E-02         1.1E-02         1.2E-02
                     1.0E-06         3.1E-02         2.6E-05           11
                       55              988             13              334

12:37----13:37       5.8E-04         9.9E-02         1.1E-02         2.8E-02
                     1.0E-06         3.1E-02         2.5E-05           11
                       54              988             13              333

12:40----13:40       5.7E-04         9.9E-02         1.1E-02         2.8E-02
                     1.0E-06         3.1E-02         2.4E-05           12
                       54              989             13              332

12:43----13:43       5.5E-04         9.9E-02         1.2E-02         3.2E-02
                     1.0E-06         3.1E-02         2.4E-05           12
                       53              989             13              331

12:46----13:46       5.3E-04         9.9E-02         1.2E-02         3.2E-02
                     1.0E-06         3.2E-02         2.3E-05           12
                       53              989             13              328
```

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HYDE PARK #4, CONT'D                                                PAGE 2

        TIME              H2S              THC               SO2            THC-CH4
                          CH4             OZONE           SOLAR RAD          TEMP
                        HUMIDITY        BAROMETER        WIND SPEED     WIND DIRECTI

   12:49----13:49       5.0E-04          9.9E-02           1.2E-02          3.4E-02
                        1.0E-06          3.2E-02           2.2E-05            12
                          52               989               13               327

   12:52----13:52       4.8E-04          9.9E-02           1.2E-02          3.4E-02
                        1.0E-06          3.2E-02           2.1E-05            12
                          52               989               13               327

   12:55----13:55       4.5E-04          6.7E-02           1.1E-02          3.4E-02
                        1.0E-06          3.2E-02           2.0E-05            12
                          51               989               14               326

   12:58----13:58       4.4E-04          4.7E-02           1.2E-02          3.2E-02
                        1.0E-06          3.3E-02           1.9E-05            12
                          51               989               14               325


                                    STATISTICS


   NUMBER OF READINGS 106

   POLLUTANT               MINIMUM    MAXIMUM   ARITHMETIC  STANDARD GEOMETRIC GEOMETRIC
                            VALUE      VALUE       MEAN     DEVIATION  MEAN     STD. DEV.

   H2S                     1.00E-06  1.17E-03  5.55E-04  2.44E-04  4.67E-04  2.28E+00
   THC                     1.00E-06  2.09E+00  8.21E-02  3.51E-01  3.65E-06  4.82E+01
   SO2                     6.72E-03  1.48E-02  1.13E-02  1.83E-03  1.11E-02  1.19E+00
   THC-CH4                 1.00E-06  6.76E+00  1.24E-01  7.01E-01  4.03E-05  1.68E+02
   CH4                     1.00E-06  3.84E-01  5.51E-03  4.19E-02  1.27E-06  5.55E+00
   OZONE                   1.68E-02  4.21E-02  3.10E-02  4.49E-03  3.07E-02  1.16E+00
   SOLAR RAD               1.00E-06  7.48E-05  2.75E-05  1.98E-05  1.74E-05  3.30E+00
   TEMP                           9        13        11         1
   HUMIDITY                      32        70        55         7        55         1
   BAROMETER                    988       990       988         0       988         1
   WIND SPEED                     4        33        14         6        13         2

                           MAXIMUM
                           AVERAGE

   H2S                     7.12E-04
   THC                     9.87E-02
   SO2                     1.16E-02
   THC-CH4                 1.90E-01
   CH4                     9.74E-03
   OZONE                   3.25E-02
   SOLAR RAD               4.00E-05
   TEMP                          12
   HUMIDITY                      59
   BAROMETER                    989
   WIND SPEED                    14
   WIND DIRECTION               337
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                                   HYDE PARK #5/6

DATE:              JUN 10
SCAN TIME:         60    SEC
AVERAGING TIME:    60    MIN
LOCATION:
TWSP LINE, 0.1KM N C.N. TRACKS ( X6860-Y5810); 0.4KM & 110 DGS/SITE

      TIME             H2S              THC              SO2            THC-CH4
                       CH4             OZONE          SOLAR RAD          TEMP
                     HUMIDITY        BAROMETER        WIND SPEED      WIND DIRECTI

15:36----16:36       9.2E-05          4.1E-02          8.4E-03          1.0E-01
                     3.0E-04          3.7E-02          7.1E-02            12
                       43               986              18               319

15:51----16:51       9.9E-05          1.3E-01          8.3E-03          1.6E-01
                     2.1E-03          3.8E-02          7.0E-02            12
                       44               987              20               313

16:06----17:06       7.6E-05          2.1E-01          8.4E-03          2.1E-01
                     6.1E-03          3.7E-02          6.5E-02            12
                       45               987              20               312

16:21----17:21       7.0E-05          2.8E-01          8.4E-03          2.4E-01
                     1.2E-02          3.7E-02          5.9E-02            12
                       46               987              20               311

16:36----17:36       6.4E-05          6.9E-01          8.3E-03          5.8E-01
                     7.9E-02          3.8E-02          5.1E-02            12
                       48               987              20               311

16:51----17:51       6.6E-05          9.5E-01          8.5E-03          8.5E-01
                     1.1E-01          3.7E-02          4.3E-02            12
                       49               987              20               312

17:06----18:06       7.1E-05          1.1E+00          8.5E-03          1.0E+00
                     1.4E-01          3.7E-02          3.9E-02            12
                       50               987              19               312

17:21----18:21       8.5E-05          1.0E+00          8.6E-03          1.0E+00
                     1.4E-01          3.7E-02          3.7E-02            12
                       50               987              19               310

17:36----18:36       1.1E-04          7.0E-01          8.6E-03          7.2E-01
                     7.6E-02          3.7E-02          3.6E-02            12
                       50               987              19               309

17:51----18:51       1.4E-04          4.5E-01          8.7E-03          4.9E-01
                     4.8E-02          3.8E-02          3.3E-02            12
                       50               987              18               307

18:06----19:06       1.7E-04          2.9E-01          8.8E-03          2.9E-01
                     1.9E-02          3.8E-02          2.7E-02            12
                       50               988              18               306

18:21----19:21       2.0E-04          2.6E-01          8.8E-03          2.5E-01
                     1.8E-02          3.9E-02          2.0E-02            12
                       51               988              17               302
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HYDE PARK #5/6, CONT'D                                                 PAGE 2

       TIME              H2S              THC              SO2            THC-CH4
                         CH4             OZONE          SOLAR RAD          TEMP
                       HUMIDITY        BAROMETER        WIND SPEED      WIND DIRECTI

 18:36----19:36        2.0E-04          1.8E-01          8.6E-03          1.2E-01
                       1.4E-02          3.9E-02          1.6E-02            11
                         53               988              16              296

 18:51----19:51        2.3E-04          8.5E-02          8.4E-03          7.1E-02
                       5.8E-03          3.9E-02          1.0E-02            11
                         54               988              14              294

 19:06----20:06        2.6E-04          5.2E-06          8.2E-03          1.1E-03
                       1.5E-06          4.0E-02          8.6E-03            11
                         55               988              14              234

 19:21----20:21        3.1E-04          5.2E-06          8.2E-03          1.0E-04
                       1.5E-06          4.0E-02          6.4E-03            11
                         57               988              12              285

 19:36----20:36        3.7E-04          5.2E-06          8.4E-03          5.6E-06
                       1.5E-06          3.8E-02          4.5E-03            11
                         60               988              10              270

 19:51----20:51        4.7E-04          5.2E-06          8.7E-03          5.6E-06
                       1.5E-06          3.6E-02          3.0E-03            10
                         63               988               8              265

 20:06----21:06        5.4E-04          5.2E-06          9.0E-03          5.6E-06
                       1.5E-06          3.4E-02          1.6E-03            10
                         66               989               7              252

 20:21----21:21        6.4E-04          5.2E-06          9.2E-03          5.6E-06
                       1.5E-06          3.3E-02          8.5E-04            10
                         69               989               6              237

 20:36----21:36        7.4E-04          5.2E-06          9.5E-03          5.0E-03
                       1.5E-06          3.1E-02          3.9E-04            10
                         70               989               6              231

 20:51----21:51        8.0E-04          5.2E-06          9.5E-03          3.0E-03
                       1.5E-06          3.1E-02          1.3E-04             9
                         72               989               6              225

 21:06----22:06        8.3E-04          5.2E-06          9.4E-03          3.7E-03
                       1.5E-06          3.0E-02          3.4E-05             9
                         75               989               5              222

 21:21----22:21        8.3E-04          5.2E-06          9.2E-03          3.6E-03
                       1.5E-06          2.9E-02          3.0E-06             9
                         79               989               5              220

 21:36----22:36        6.8E-04          1.3E-02          6.8E-03          1.5E-03
                       3.5E-03          4.0E-02          1.2E-06             7
                         63               775               4              227

 21:51----22:51        4.6E-04          1.3E-02          4.5E-03          1.5E-03
                       3.5E-03          3.2E-02          1.2E-06             4
                         44               528               3              217
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      TIME              H2S              THC             SO2           THC-CH4
                        CH4             OZONE         SOLAR RAD         TEMP
                     HUMIDITY         BAROMETER       WIND SPEED     WIND DIRECTI

22:06----23:06        3.1E-04          1.5E-02         2.5E-03         2.2E-03
                      3.6E-03          2.5E-02         1.3E-06               2
                           27              314               2             230

22:21----23:21        3.8E-04          3.7E-02         2.8E-03         1.6E-02
                      9.0E-03          2.4E-02         1.8E-06               2
                           29              314               1             252

22:36----23:36        6.2E-04          6.6E-02         5.3E-03         4.3E-02
                      1.7E-02          1.1E-02         2.0E-06               4
                           49              528               2             243

22:51----23:51        9.1E-04          7.0E-01         8.0E-03         3.7E-01
                      1.2E-01          1.8E-02         2.4E-06               6
                           73              776               3             252


                                 STATISTICS


NUMBER OF READINGS 505

POLLUTANT             MINIMUM    MAXIMUM   ARITHMETIC  STANDARD  GEOMETRIC  GEOMETRIC
                       VALUE      VALUE       MEAN     DEVIATION   MEAN      STD. DEV.

H2S                  1.00E-06  3.09E-03  3.99E-04  4.17E-04  8.17E-05  1.50E+01
THC                  1.00E-06  9.37E+00  3.23E-01  1.01E+00  4.30E-05  3.86E+02
SO2                  1.00E-06  1.29E-02  8.15E-03  2.75E-03  4.12E-03  1.24E+01
THC-CH4              1.00E-06  5.34E+00  2.68E-01  7.45E-01  1.65E-04  4.61E+02
CH4                  1.00E-06  1.32E+00  4.29E-02  1.66E-01  8.65E-06  9.09E+01
OZONE                1.00E-06  6.53E-01  3.35E-02  3.50E-02  1.37E-02  1.87E+01
SOLAR RAD            1.00E-06  8.04E-02  2.12E-02  2.75E-02  7.62E-04  9.46E+01
TEMP                        0        13        10         3
HUMIDITY                    0        96        56        23        14       134
BAROMETER                   0      1007       908       270       184       288
WIND SPEED                  0        35        12         8         3        87

                      MAXIMUM
                      AVERAGE

H2S                   9.06E-04
THC                   1.09E+00
SO2                   9.52E-03
THC-CH4               1.04E+00
CH4                   1.45E-01
OZONE                 4.05E-02
SOLAR RAD             7.08E-02
TEMP                        12
HUMIDITY                    79
BAROMETER                  989
WIND SPEED                  20
WIND DIRECTION             319
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HE
1783
.C36
R47
1980